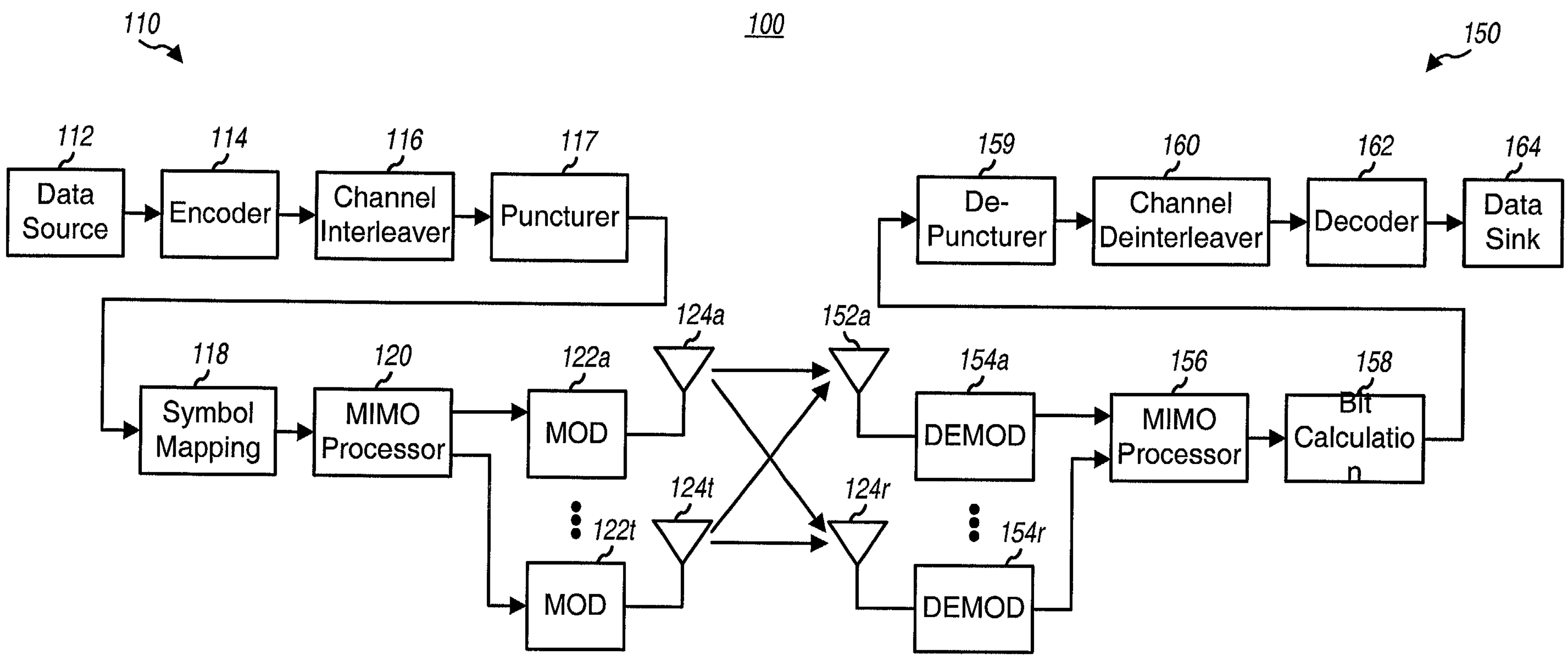


100
110
150
112
Data Source
114
Encoder
116
Channel Interleaver
117
Puncturer
118
Symbol Mapping
120
MIMO Processor
122a
MOD
122t
MOD
124a
124t
152a
124r
154a
DEMOD
154r
DEMOD
156
MIMO Processor
158
Bit Calculation
159
De-Puncturer
160
Channel Deinterleaver
162
Decoder
164
Data Sink

FIG. 1

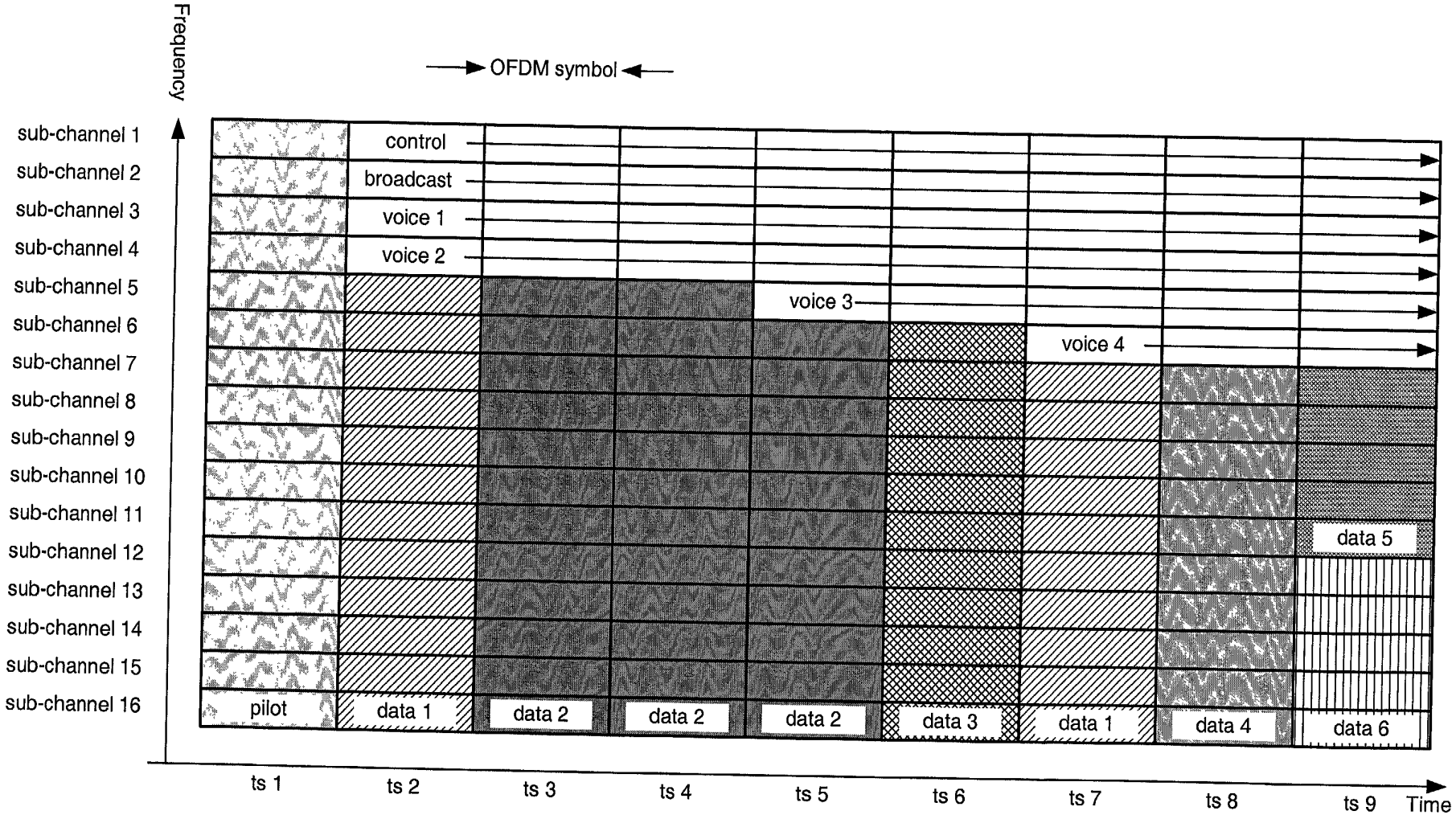

Frequency
OFDM symbol
sub-channel 1
sub-channel 2
sub-channel 3
sub-channel 4
sub-channel 5
sub-channel 6
sub-channel 7
sub-channel 8
sub-channel 9
sub-channel 10
sub-channel 11
sub-channel 12
sub-channel 13
sub-channel 14
sub-channel 15
sub-channel 16
control
broadcast
voice 1
voice 2
voice 3
voice 4
data 5
pilot
data 1
data 2
data 2
data 2
data 3
data 1
data 4
data 6
ts 1
ts 2
ts 3
ts 4
ts 5
ts 6
ts 7
ts 8
ts 9
Time

FIG. 2

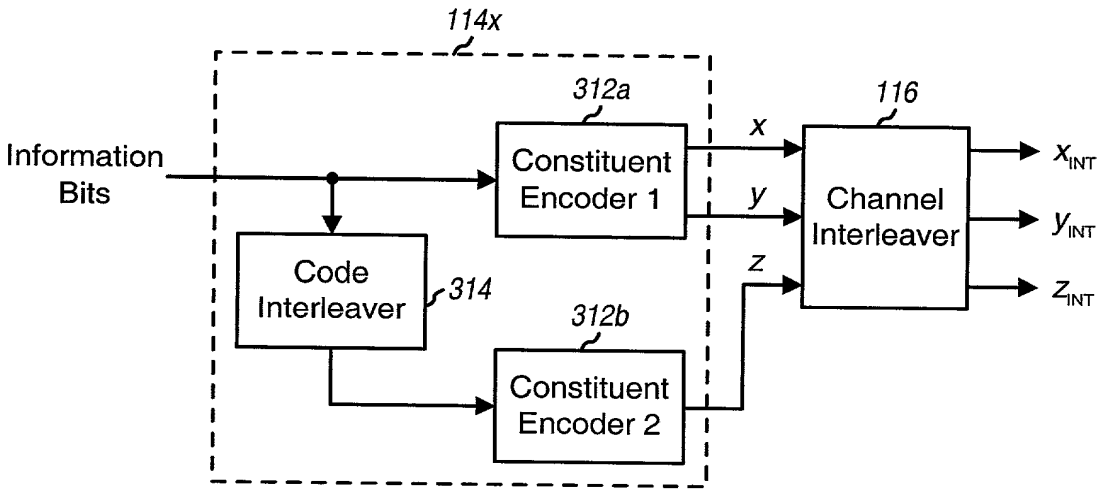

114x
312a
116
Information Bits
Constituent Encoder 1
x
y
Channel Interleaver
x_{INT}
y_{INT}
z_{INT}
Code Interleaver
314
z
312b
Constituent Encoder 2

FIG. 3A

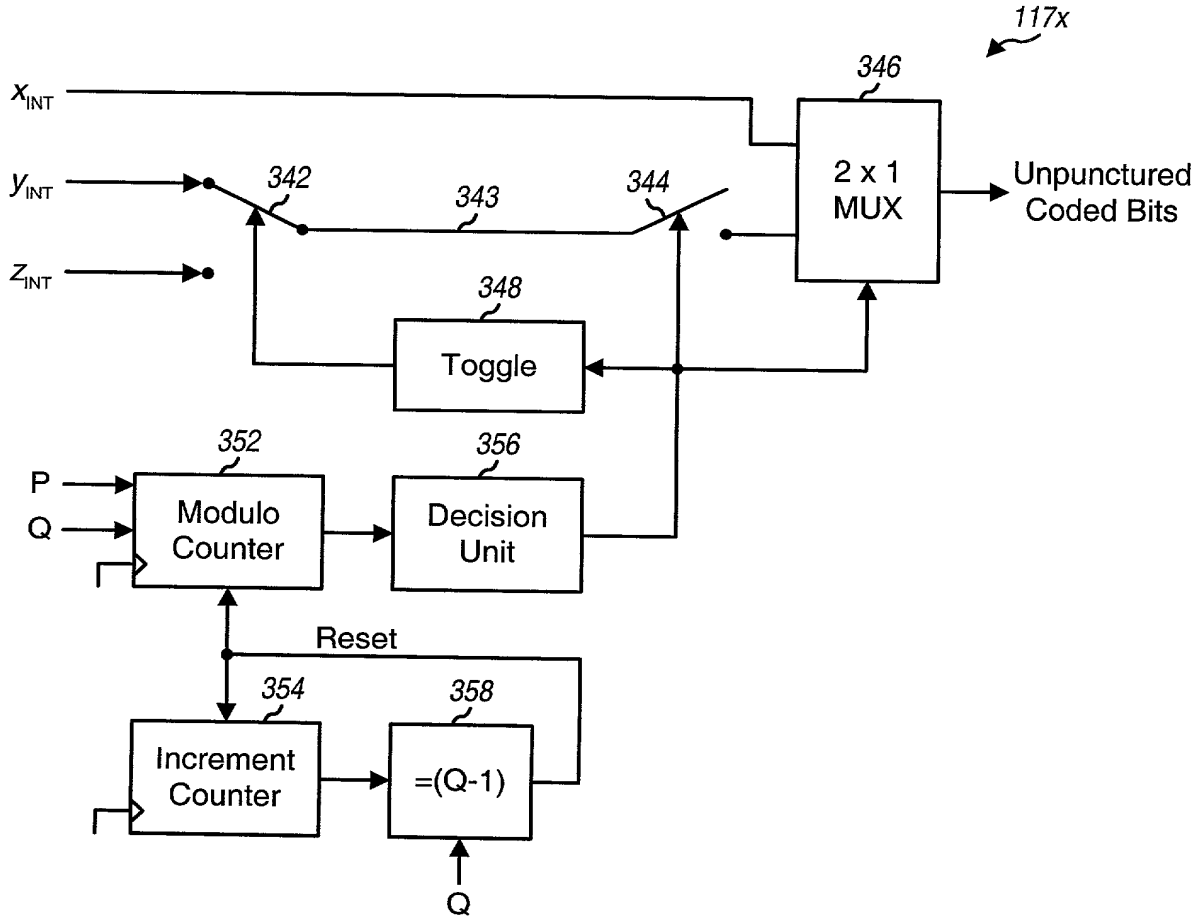
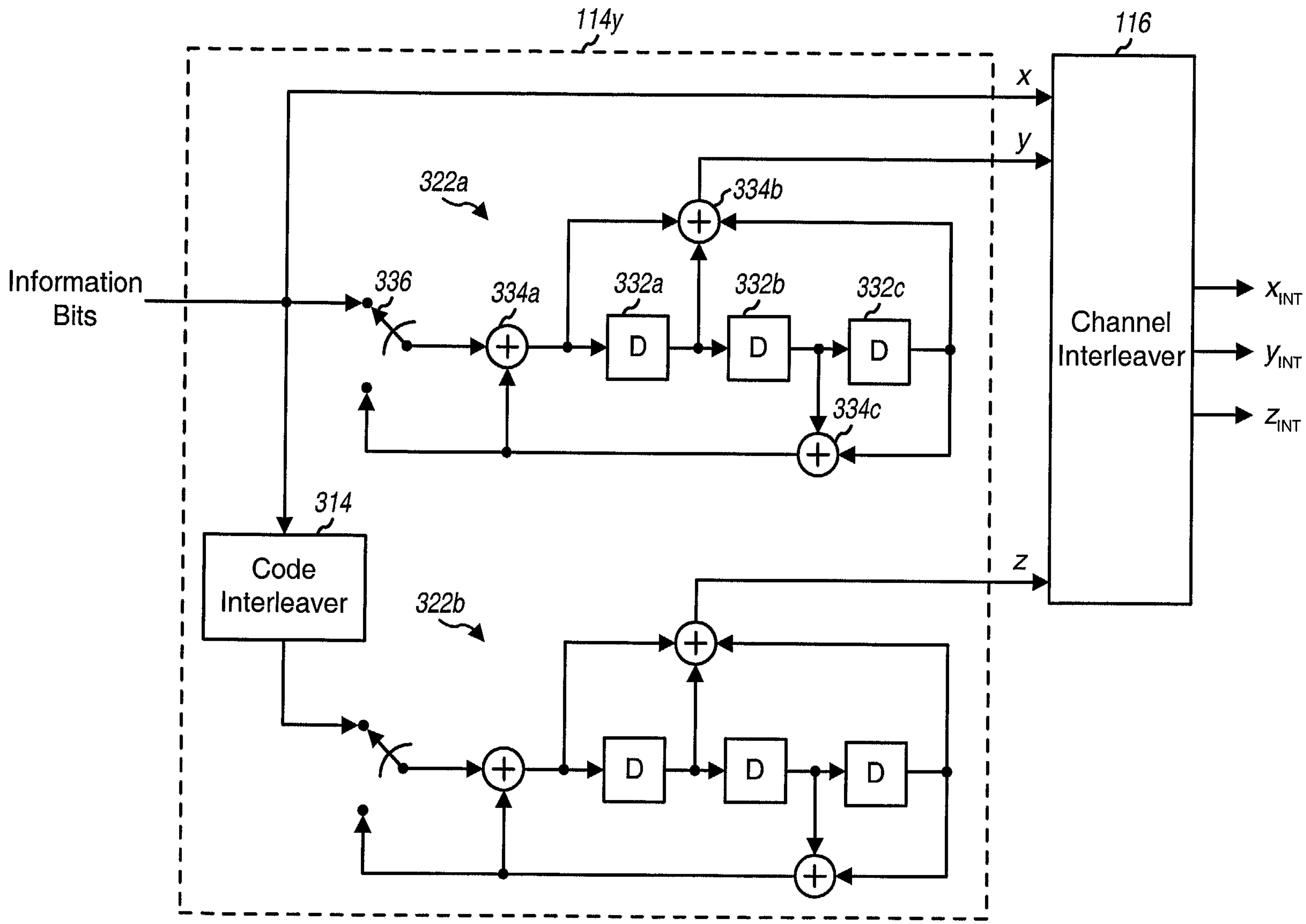

117x
346
x_{INT}
y_{INT}
342
343
344
2 x 1 MUX
Unpunctured Coded Bits
z_{INT}
348
Toggle
352
356
P
Q
Modulo Counter
Decision Unit
Reset
354
358
Increment Counter
=(Q-1)
Q

FIG. 3C



114y
116
Information
Bits
x
y
z
322a
334b
336
334a
332a
332b
332c
D
D
D
334c
314
Code
Interleaver
322b
D
D
D
Channel
Interleaver
x_{INT}
y_{INT}
z_{INT}

FIG. 3B

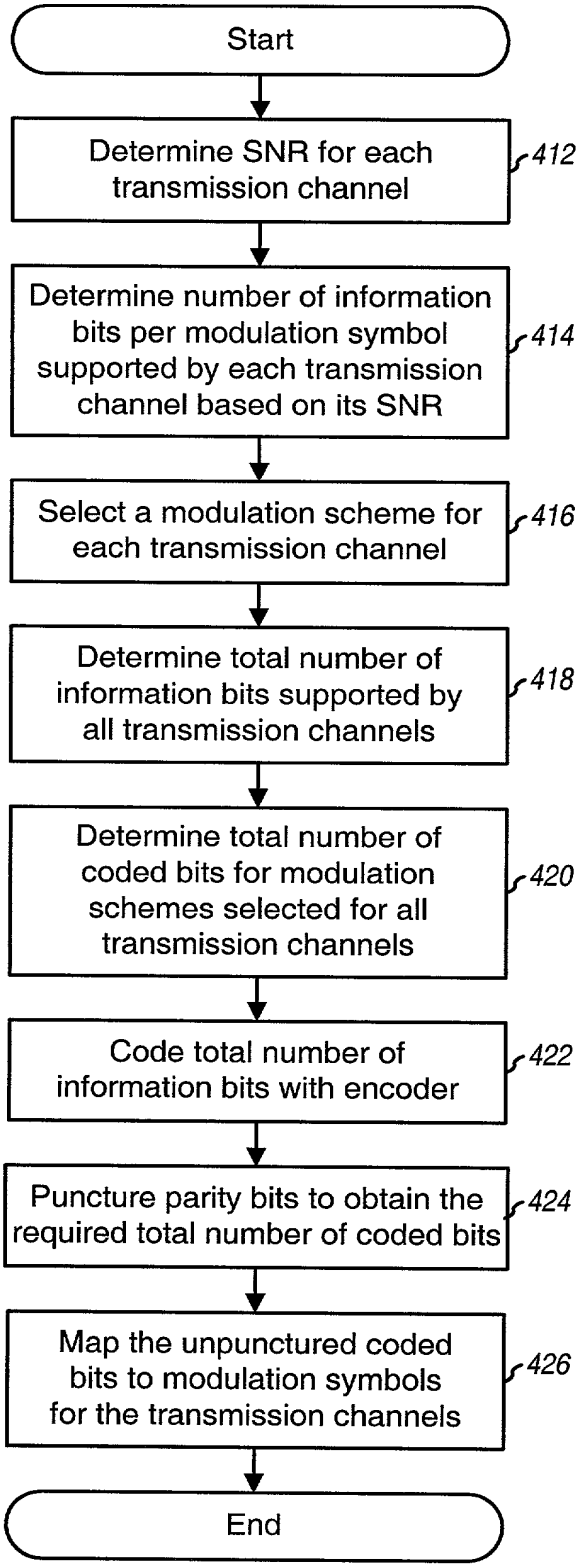

Start
Determine SNR for each transmission channel
412
Determine number of information bits per modulation symbol supported by each transmission channel based on its SNR
414
Select a modulation scheme for each transmission channel
416
Determine total number of information bits supported by all transmission channels
418
Determine total number of coded bits for modulation schemes selected for all transmission channels
420
Code total number of information bits with encoder
422
Puncture parity bits to obtain the required total number of coded bits
424
Map the unpunctured coded bits to modulation symbols for the transmission channels
426
End

FIG. 4A

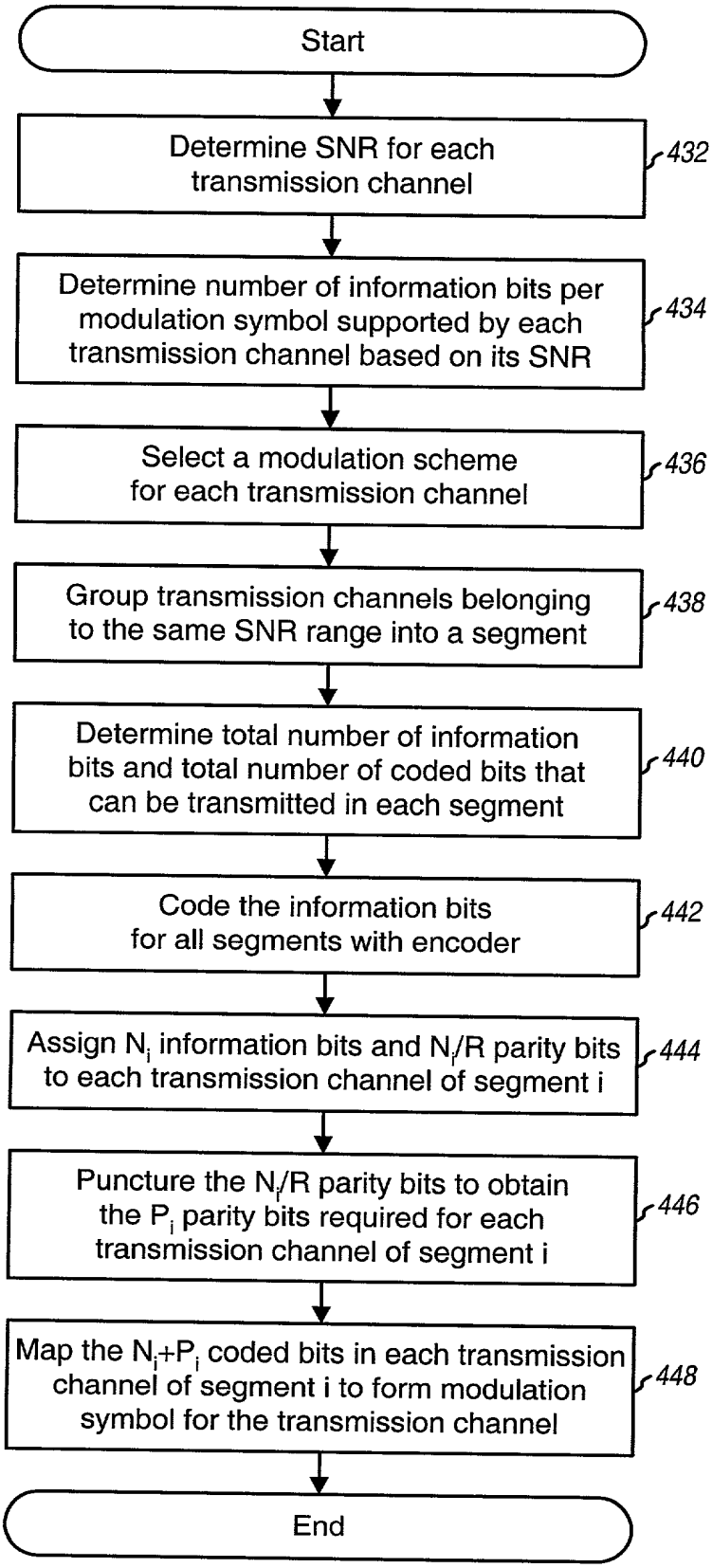

Start
Determine SNR for each transmission channel
432
Determine number of information bits per modulation symbol supported by each transmission channel based on its SNR
434
Select a modulation scheme for each transmission channel
436
Group transmission channels belonging to the same SNR range into a segment
438
Determine total number of information bits and total number of coded bits that can be transmitted in each segment
440
Code the information bits for all segments with encoder
442
Assign N_i information bits and N_i/R parity bits to each transmission channel of segment i
444
Puncture the N_i/R parity bits to obtain the P_i parity bits required for each transmission channel of segment i
446
Map the N_i+P_i coded bits in each transmission channel of segment i to form modulation symbol for the transmission channel
448
End

FIG. 4B

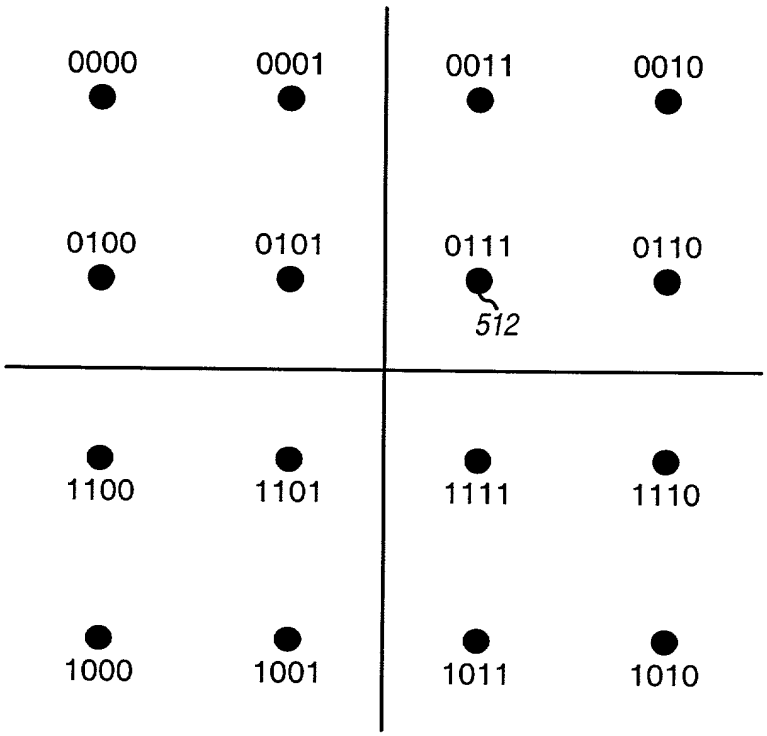

0000
0001
0011
0010
0100
0101
0111
0110
512
1100
1101
1111
1110
1000
1001
1011
1010

FIG. 5

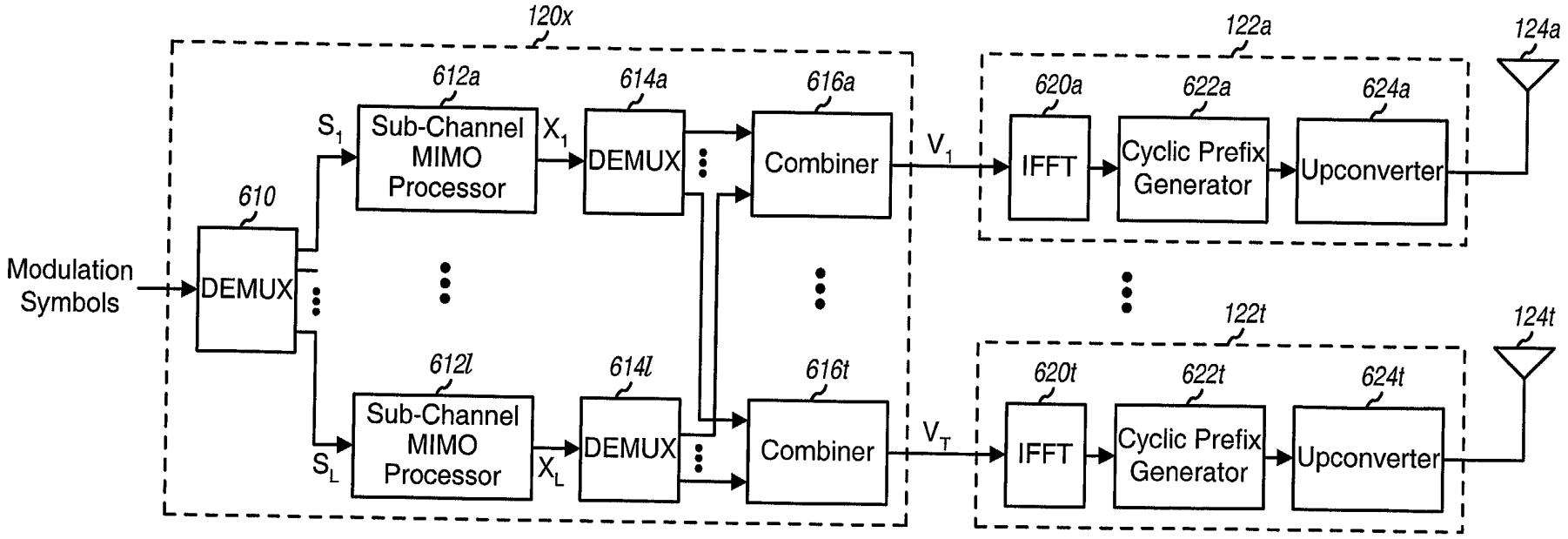

120x
610
612a
614a
616a
612l
614l
616t
Modulation Symbols
DEMUX
Sub-Channel MIMO Processor
DEMUX
Combiner
S_1
X_1
S_L
X_L
V_1
V_T
122a
620a
622a
624a
IFFT
Cyclic Prefix Generator
Upconverter
124a
122t
620t
622t
624t
124t

FIG. 6

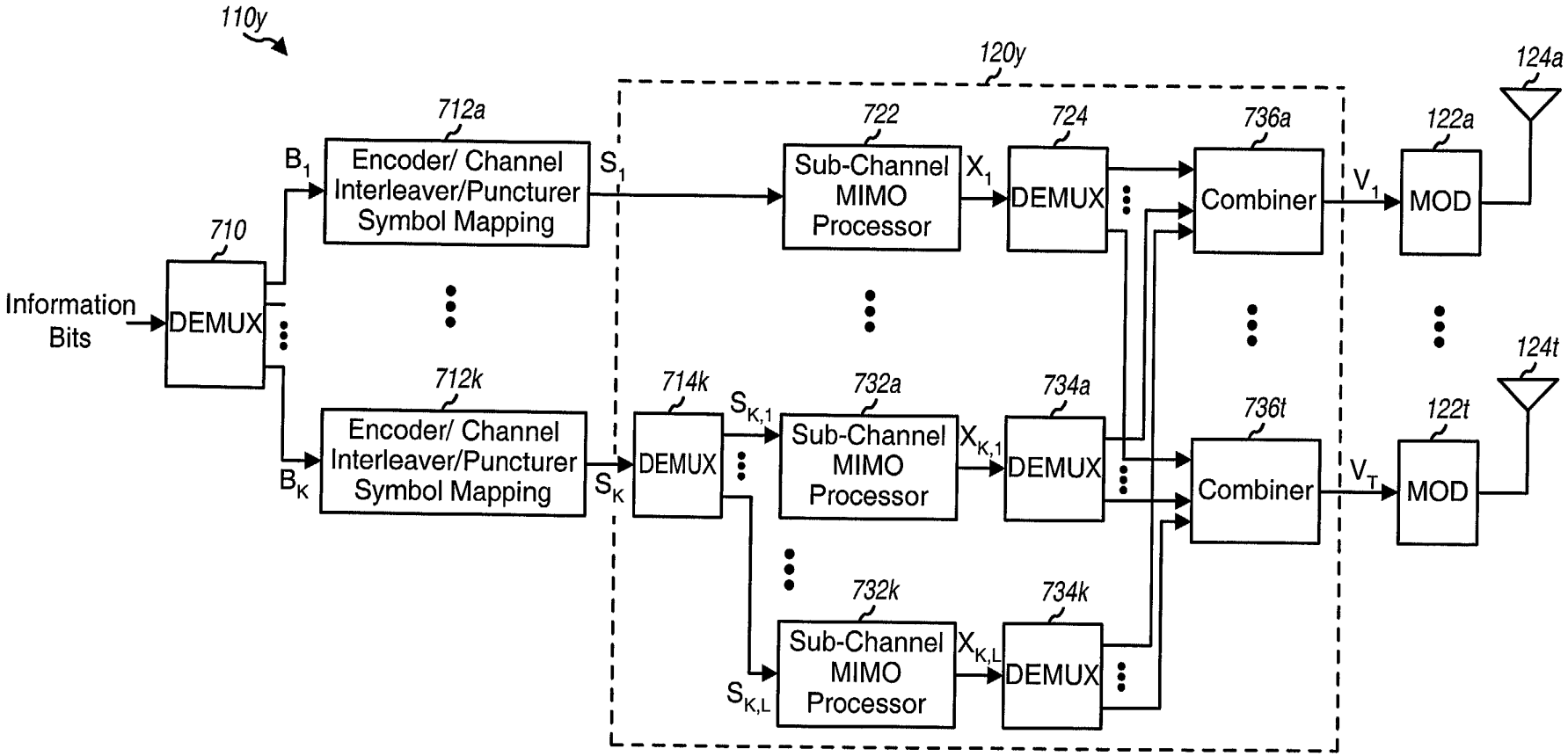

110y
120y
124a
712a
722
724
736a
122a
B1
Encoder/ Channel Interleaver/Puncturer Symbol Mapping
S1
Sub-Channel MIMO Processor
X1
DEMUX
Combiner
V1
MOD
710
Information Bits
DEMUX
712k
714k
SK,1
732a
734a
736t
122t
124t
Encoder/ Channel Interleaver/Puncturer Symbol Mapping
BK
SK
DEMUX
Sub-Channel MIMO Processor
XK,1
DEMUX
Combiner
VT
MOD
732k
734k
Sub-Channel MIMO Processor
XK,L
DEMUX
SK,L

FIG. 7

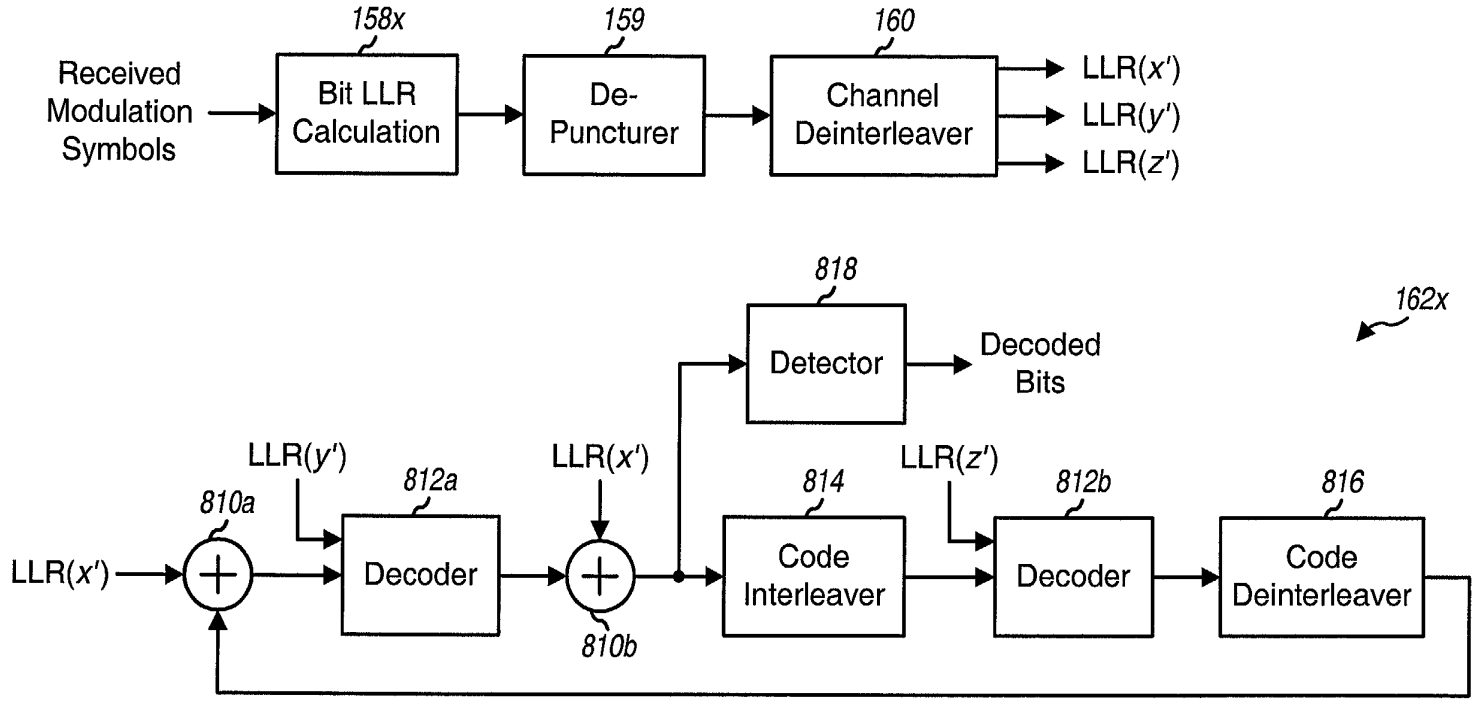

158x
159
160
Received Modulation Symbols
Bit LLR Calculation
De-Puncturer
Channel Deinterleaver
LLR(x')
LLR(y')
LLR(z')
818
162x
Detector
Decoded Bits
LLR(y')
LLR(x')
LLR(z')
812a
814
812b
816
810a
LLR(x')
Decoder
Code Interleaver
Decoder
Code Deinterleaver
810b

FIG. 8